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EXAMINER

SAGAR, KRIPA

| ART UNIT | PAPER NUMBER |
|----------|--------------|
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1756

DATE MAILED: 10/24/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/069,951

Applicant(s)

GAUCHER, PHILIPPE

Examiner

Kripa Sagar

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 March 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 3/7/02 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. Figures 1 and 3 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 1, 11 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The components of the resin are not clearly defined. The claim recites that the resin comprises simple or complex metal-alkoxides OR acetylacetone (AcAcH) OR hexamethylenetetramine (HMTA) AND an acid . The specification suggests that there are three groups of components (metal-alkoxides, chelating acid and an organic agent such as AcAcH).

The claim recites a "crosslinked" resin comprising these components. It is unclear whether the resin is "cross-linkable" or the claim is directed to the resin in the "cross-linked" state after irradiation. Prior art and the specification (p. 7;l.33-35)

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suggest a "polymerized" resin is generally used for an image-forming layer. The resin is cross-linked upon irradiation.

Claim 11 recites preparing the solution (of alkoxides) "in the presence of a heavy alcohol of 2-ethylhexanol type". The use of the term "type" renders the claim vague and indefinite because it includes elements not disclosed.

The term "in the presence of" is vague and unclear. The specification suggests the use of a Pb-carboxylate comprising 2-ethylhexanoate and optionally the use of 2-ethylhexanol as a solvent. The above term does not require 2-ethylhexanoate moiety for the Pb-bearing compounds.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1- 6, 10-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over non-patent literature of Tohge and co-worker (Jl.Mat.Sc.,v10, (1999) p.273-277) in view of US Pat. 5244691 to Valente et al.

The invention discloses a resin for forming oxide thin films, a process of forming oxide thin films from the resin and devices comprising such thin film oxides.

Claims 1-6 are directed towards a resin composition comprising metal alkoxides, chelating organic agents, acids and a photoinitiator.

Claims 10-17 recite the process steps of coating a resin comprising metal alkoxides, patterning the coated film by photolithographic steps, drying and sintering the patterned layer to form the oxide pattern.

Tohge teaches a method of forming photosensitive resins containing polymerized alkoxides. The resins are formed from the reaction of *metal n-butoxides* with chelating agents *AcAcH* or benzylacetone (*BzAcH*). The metal alkoxides include *Ti- and Zr-alkoxides*. Tohge does not add *acetic acid* and *Pb-carboxylate* instead uses Pb-acetate. A *complex alkoxide Pb-Zr-Ti (PZT)* bearing resin is formed. The resin is coated and patterned with *UV irradiation* (p.273-274). The substrates may be *glass* or *Si*. The patterning steps include *exposure* through a *mask* and *development* of unexposed areas. The patterned areas are sintered to form the oxides (fig.1). In the past, similar processes were used to pattern oxides such as *ZrO₂*, *TiO₂*, *Al₂O₃*, *SiO₂* from their *simple alkoxides* (p273). Tohge teaches the formation of *ferroelectric* thin films

Tohge does not teach the addition of an acid or HMTA (cl.1,6,10). Tohge does not teach the use of a heavy alcohol as a functional radical or solvent (cl.11).

Valente teaches the fabrication of ceramic films by spin coating a resin comprising the ceramic and sintering the film. A sol-gel process is used where the ceramic composition is formed from the *metal-alkoxide* and Pb-acetate. It teaches the use of *AcAcH* and *HMTA* to form the polymer. *Acetic acid* stabilizes the resin and may also be used as a *solvent* along with an alcohol such as methoxyethanol (3; 44-4;5). The film is dried and sintered. It may be noted that both Valente and Tohge teach

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formation of oxide thin films by sol-gel and photo-patterning. Valente teaches that the process is complex and difficult to control (2;6-18).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Valente to form the oxide films of Tohge because Valente's compositions reduce the number of components(3;21-24), may be adapted to deposit a large number of diverse materials and provide tight controls on the rheology and deposition (3;25-37).

6. Claims 7,8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tohge in view of Valente as applied to claim 1 above and further in view of US Pat. 4957945 to Cohn and further in view of US Pat.6002031 to Duncombe et al.

The claims recite the use of propanoic acid and tetrafluoroacetic acid as solvents.

The teachings of Tohge and Valente have been discussed above. Tohge does not teach the use of acids. Valente teaches the use of acetic acid. They do not teach the use of the propanoic acid and tetrafluoroacetic acid.

Duncombe teaches the use of carboxylic acids in forming metal oxide films from a modified sol-gel process; this includes propanoic acid (4;31-33). Duncombe does not use tetrafluoroacetic acid.

Cohn teaches that fluorinated carboxylic acids in general and tetrafluoroacetic acid are well known solvents for polymers (5;67 –6;3). Their low-boiling point is emphasized and the evaporation at low temperatures is noted (5;52-55).

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It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute propanoic acid or tetrafluoroacetic acid for Valente's acetic acid as a solvent in Tohge's sol-gel process because carboxylic acids in general (Duncombe) and fluorinated carboxylic acids in particular (Cohn) are suitable solvents for polymers that may be used with a reasonable expectation of success in forming sol-gel polymers.

7. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tohge in view of Valente as applied to claim 1 above, and further in view of US Pat. 5846686 to Kamisawa.

This claim recites the addition of a photoinitiator to the resin.

Kamisawa teaches the addition of a photoactive compound to a resin comprising alkoxides and used in forming ceramic films (9; 53-67).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add a photoactive compound to Valente's resin used for forming a ceramic film as taught by Tohge because Kamisawa teaches that this increases the image resolution and facilitates development of the exposed film (11;53-12;14)

8. Claims 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tohge in view of Valente as applied to claim 10 above, and further in view of Duncombe and further in view of US Pat.5904911 to Mori et al.

The claims recite making piezo- and ferro-electric devices using a sol-gel process with metal alkoxide pre-cursors.

The teachings of Tohge and Valente have been discussed above. Tohge does not teach specific applications of the oxide films formed by the liquid deposition method. Valente teaches application of the process to forming ferroelectric capacitors (4;49-54) and memories (4;66-68). Valente does not teach its use in piezo-electric devices.

Mori teaches that it is known in the art to use complex perovskitic oxides as piezo-electric materials (1;14-16).

It would have been obvious to one of ordinary skill in art at the time the invention was made to form oxide films by the methods taught by Mori, Valente and Tohge to fabricate capacitors, memory cells and piezo-electric devices because Mori and Valente teach that these are well-known and conventional uses of such oxides in the industry and that there is a reasonable expectation of success in fabricating the devices by such methods.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kripa Sagar whose telephone number is 703-605-4427. The examiner can normally be reached on 8:00AM--5:00PM (M-F).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark F Huff can be reached on 703-308-2464. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

A handwritten signature in black ink, appearing to read "Mark F. Huff", with a long horizontal flourish extending to the right.

MH/ks
October 19, 2002

MARK F. HUFF
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700